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Decision-Making and Risk Management in School Bullying Risk: Serial Mediation of Peer Relationships and Internet Addiction between Negative Parenting Styles and Adolescent Bullying

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ABSTRACT

Understanding the underlying causes of school bullying is essential for developing effective prevention strategies. This study aims to investigate the impact of negative parenting styles on school bullying behaviors among adolescents, emphasizing the serial mediation role of peer relationships and internet addiction. In addition, the study frames school bullying as a decision-making and risk management challenge within organizational and governance contexts, highlighting how evidence-based models can guide sustainable operations management. A survey was administered to 756 randomly sampled students from junior and senior high schools in Henan, China. Assessment tools included the Parenting Styles Scale, Peer Relationships Scale, Internet Addiction Questionnaire, and School Bullying Behaviors Questionnaire. (1) Significant pairwise correlations were found between any two of the studied variables: negative parenting styles, peer relationships, internet addiction, and school bullying behavior. (2) Parental rejection and overprotection are two dimensions of negative parenting, and both were positive predictors of school bullying behaviors. (3) The impact of negative parenting styles on school bullying behaviors was mediated by three pathways: parental rejection → peer relationships → school bullying, parental overprotection → peer relationships → school bullying, and parental rejection → peer relationships → internet addiction → school bullying. Viewing bullying as an organizational risk, we map the mechanisms into a PDCA loop: identification via brief screeners to create risk profiles; intervention through parenting support, classroom-climate routines, and tiered digital-behavior programs; and evaluation using operational indicators (peer-relationship means, ≥4 internet-addiction proportion, bullying incidence). Digital-behavior programs are prioritized when parental rejection is salient, whereas autonomy-support and peer-climate strengthening dominate under overprotection, with digital governance added only when peer deficits co-occur with problematic use—thus enabling evidence-based, socially sustainable school governance. Overall, the contribution of this study lies in integrating psychological, social, and behavioral insights into a structured decision-making framework, thereby advancing risk management and operations-management approaches for educational governance.

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1. Introduction

School bullying significantly endangers the physical and mental well-being of adolescents [9]. Victims of bullying suffer humiliation and oppression, leading to reduced self-esteem and an aversion to social interactions. School bullying can result in adverse psychological outcomes Cheng [4], including depression and complex post-traumatic stress disorder [13]. In contrast, bullies release their aggressive instincts through bullying, and the lack or delay of punishment reinforces their violent behaviors. This often leads to a gradual erosion of moral boundaries and the development of an antisocial personality. Moreover, bullies may become disdainful of legal authority, potentially leading them to escalate to more serious acts of violence. Clearly, bullying behavior represents a considerable threat to the health, growth, and development of all adolescents involved. Recognizing this, in June 2021, the Ministry of Education provided a precise definition of bullying and introduced a management strategy aimed at improving the school learning environment and ensuring a healthier campus life for students. To effectively prevent bullying incidents, the contributing factors and mechanisms behind bullying behaviors among adolescents must be investigated. Beyond the psychological and educational dimensions, school bullying can also be understood as a decision-making and risk-management issue in organizational governance. Framing it this way allows evidence-based strategies, monitoring systems, and structured interventions to be applied, consistent with operations management approaches emphasized in decision-making research. During adolescence, often referred to as the “psychological weaning period,” teenagers’ self-awareness and adult-like behaviors intensify, and their need for recognition grows. Parents, as primary socialization agents, play a critical role in shaping social behaviors and norms and are key figures in adolescent identity formation. However, negative parenting styles can be a significant source of frustration for adolescents [24]. Extensive research links various parenting styles with children’s psychological and behavioral issues. For example, the level of emotional warmth and understanding, punishment, and denial of parental affection can correlate with a child’s propensity for violence to varying degrees. Adolescents often mimic and internalize negative parental behaviors and attitudes, justifying such behaviors within school social settings [2]. Thus, children from strict and authoritarian families may be more prone to engage in bullying as a means of navigating social relationships [11]. This leads to our first hypothesis: Negative parenting styles directly predict the prevalence of school bullying behaviors among adolescents.

From a social psychology perspective, bullying is an aggressive response directed at an alternative target when direct confrontation with the source of frustration is not feasible, essentially seeking a “scapegoat.” Scapegoats are often vulnerable and have distinctive traits, such as being shy, introverted, or socially awkward, or having unique appearances and behaviors. These students are frequently targeted for exclusion and bullying. Thus, the nature of peer relationships can be both a marker of an adolescent’s social adaptability and a predictor of potential victimization. Furthermore, extensive evidence suggests a strong link between parenting styles, family dynamics, and interpersonal relationships. For example, Young [23] indicated that children treated strictly by parents tend to be overly cautious in interactions and sensitive to rejection, and they reinforce negative experiences with their parents in their interactions with peers, gradually becoming fearful of socializing. In addition, many studies Hu and Feng [8] have shown that negative parenting styles, such as overprotection and rejection, correlate with social difficulties in dormitories, with parental rejection notably diminishing college students’ sense of social responsibility. Consequently, our second hypothesis posits that negative parenting styles indirectly predict school bullying behaviors among adolescents through their impact on peer relationships.

Additionally, some scholars believe that children of parents who often employ negative

parenting methods, such as denial and punishment, are more prone to develop internet dependency. Coincidentally, adolescents with internet addiction frequently experience a lack of understanding from their parents, as well as a shortage of parental recognition and family warmth. Thus, the connection between parents' negative parenting styles and internet addiction in adolescents is quite apparent. Research has also identified the "psychological reference function" of oneself and peers as the second most significant factor influencing healthy internet behaviors in adolescents, following the "experience guiding function" of parents. An adolescent's internet behavior is most strongly correlated with that of their closest friends and, subsequently, with classmates of the same gender and class. Excessive internet use among peers can significantly predict the degree of internet addiction among college students, and it can do so indirectly through the mediating variable of peer pressure related to internet use [22]. Therefore, we believe that peer relationships significantly influence internet addiction among adolescents. Moreover, there is a notable link between internet addiction in adolescents and school bullying. Research by Hu and Feng [8] demonstrated a positive correlation between moderate or severe internet addiction in adolescents and the incidence of school violence, whereas normal internet use among these adolescents is negatively correlated with the occurrence of school violence. Adolescents with internet addiction are 2.63 times more likely to experience school violence compared to those with normal internet usage, establishing internet addiction as a risk factor for experiencing school violence among this group [24]. Thus, the third hypothesis of this study is that negative parenting styles can indirectly predict school bullying behaviors among adolescents by influencing internet addiction. The fourth hypothesis asserts that peer relationships and internet addiction play a serial mediation role between negative parenting styles and school bullying behaviors among adolescents.

This study treats school bullying as an organizational safety and operations risk and embeds the empirically supported family-peer-internet pathway into a Plan–Do–Check–Act (PDCA) governance loop. In the Identification phase, a brief screening bundle—the s-EMBU-C (rejection/overprotection), the self-rated peer-relationship scale, the 8-item Internet-Addiction questionnaire, and the Bullying Behaviors questionnaire—yields student risk profiles (rejection-exposure, overprotection-dominant, peer-deficit, combined high-risk) to prioritize resources. The Intervention phase operationalizes three levers: family management (parent-coaching to recalibrate rejecting or overprotective practices), classroom-climate management (prosocial norms and supportive peer networks), and tiered digital-behavior governance (universal literacy, selected small-group skills, indicated individualized plans). Consistent with our mediation results, digital-behavior programs are prioritized when parental rejection is salient, whereas autonomy-support and peer-climate routines are emphasized under overprotection. The Evaluation and Improvement phase uses operational indicators—mean peer-relationship scores, the proportion meeting the ≥ 4 internet-addiction cutoff, bullying incidence, and parent participation—to run monthly reviews and iterative adjustments. This operations-management design specifies process ownership and role coordination (a vice-principal-led anti-bullying team; student-affairs coordination; homeroom teachers and counselors as implementers; an IT center for data and early-warning; a parent committee for family education), thereby translating evidence into actionable risk-management strategies and enabling evidence-based decisions for socially sustainable school governance.

In summary, to effectively prevent school bullying incidents, exploring the risk factors and mechanisms of school bullying among adolescents is crucial. While there is a complex interplay between negative parenting styles, peer relationships, internet addiction, and school violence, much of the current research focuses solely on the direct impacts of parenting styles on school bullying behaviors, often neglecting to combine the equally critical factors of peers and problematic

behaviors to assess their influence on school bullying. Therefore, this study aimed to investigate the impact of parenting styles (family factors) on bullying behaviors among adolescents and to examine the action mechanisms of peer relationships (peer factors) and internet addiction (problematic behaviors).

2. Materials and Methods

Guided by an organizational risk-management perspective, we built a PDCA-oriented measurement architecture that maps constructs to actionable governance levers and to operations-management indicators. Specifically, (i) the family-management lever is indexed by the s-EMBU-C rejection and overprotection dimensions; (ii) the classroom-climate lever is indexed by the Self-Rating Scale for Peer Relationships (higher scores indicate poorer peer relations); and (iii) the digital-behavior governance lever is indexed by the 8-item Internet Addiction Questionnaire (cutoff ≥ 4 for addiction). These instruments function both as risk-identification variables (to inform tiered intervention design and resource allocation) and as process indicators for monitoring implementation. The Bullying Behaviors Questionnaire for Adolescents is designated as the primary outcome for policy monitoring. To enable cross-metric comparability and governance-ready risk profiling, all predictor variables were standardized (z-scores) prior to analysis, with gender controlled in the models—thus linking the empirical strategy to evidence-based decisions for socially sustainable school governance.

2.1 Participants

Using convenience random sampling, students from a junior high and a senior high school in a city in Henan Province, China, were selected as participants. A total of 756 questionnaire responses were considered valid, and the final sample comprised 390 male and 366 female students.

2.2 Instruments

2.2.1 Parenting Styles Scale (Short-Egna Minnenar Barndoms Uppfostran-China, s-EMBU-C)

The Chinese version of the simplified scale, revised by Chen et al. [3], includes three dimensions: parental emotional warmth, rejection, and overprotection. In this study, the dimensions of parental rejection and overprotection were specifically categorized as negative parenting styles. The scale comprises 21 items rated on a 4-point Likert scale where 1 = never = and 4 = always. In this study, the Cronbach's alpha coefficient for this scale was 0.891.

2.2.2 Self-Rating Scale for Peer Relationships

Developed by Chou and Lee [5] and revised by Zhu et al. [25] this instrument is designed to reflect children and adolescents' subjective experiences and feelings in social interactions. It includes 22 items rated on a 4-point Likert scale where 1 = not like this and 4 = always like this, with items 11, 12, 15, 17, 19, 20, and 21 reverse scored. A higher total score indicates poorer peer relationships. In this study, the Cronbach's alpha coefficient for this scale was 0.896.

2.2.3 Bullying Behaviors Questionnaire for Adolescents

Created by Li et al. [12] this questionnaire includes 21 items across five dimensions: verbal bullying, physical bullying, vicarious bullying, relational bullying, and cyberbullying. It utilizes a 5-point Likert scale ranging from 1 = completely disagree to 5 = completely agree. Higher scores indicate more severe bullying behaviors. In this study, the Cronbach's alpha coefficient for this scale was 0.973.

2.2.4 Internet Addiction Questionnaire

Designed by Moon et al. [15], this questionnaire comprises eight items and uses a 2-point scoring system, where yes = 1 and no = 0. Higher scores indicate higher levels of internet addiction, with a score of four or above classified as internet addiction. In this study, the Cronbach's alpha coefficient for this scale was 0.898.

3. Results

3.1 Common Method Bias

The Harman single-factor test was used to assess common method bias. The results showed that, before rotation, 10 factors with eigenvalues greater than 1 explained 69.61% of the variance. The first factor accounted for 27.26% of the variance below the 40% threshold, indicating no severe common method bias in this study.

3.2 Descriptive Statistics and Correlation Analysis

Table 1 presents the mean values, standard deviations, and correlation coefficients of the main variables. The correlation analysis revealed significant pairwise correlations among peer relationships, negative parenting styles (rejection, overprotection), school bullying behaviors, and internet addiction.

Table 1

Correlation Analysis of the Main Variables

No.	Variable	M ± SD	1	2	3	4	5
1	Parental rejection	8.73 ± 3.89	1				
2	Parental overprotection	16.42 ± 4.35	0.567**	1			
3	Peer relationships	42.75 ± 11.03	0.488**	0.461**	1		
4	Internet addiction	1.80 ± 2.53	0.195**	0.088*	0.207**	1	
5	School bullying behaviors	35.10 ± 17.23	0.459**	0.314**	0.311**	0.209**	1

Note: p < 0.05, ** p < 0.001 (same below).

3.3 Construction and Testing of Serial Mediation Models

After standardizing the original data for all predictive variables, Hayes' PROCESS Model 6 (controlling for the gender variable, Bootstrap = 5,000, 95% confidence interval (CI)) was utilized to test the direct effects of negative parenting styles on bullying behaviors among adolescents, as well as the mediating roles of peer relationships and internet addiction.

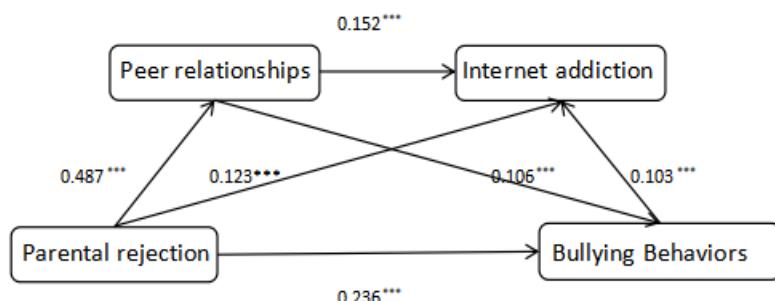


Fig.1: Results of the Mediation Effect Analysis Involving Parental Rejection

The results of the mediation effect analysis (shown in Table 2 and Figure 1) indicate that the direct effect was significant at 0.236 (p < 0.05) for predicting school bullying behaviors by parental rejection, with a 95% CI of [0.195, 0.269], not including 0, accounting for 52.73% of the total effect.

The mediating effects of peer relationships and internet addiction between parental rejection and school bullying behaviors were significant at 0.072, with a 95% CI of [0.023, 0.120], not including 0, accounting for 15.77% of the total effect. Specifically, the mediating effects consist of indirect effects from three pathways: the first indirect effect was generated through the pathway of parental rejection → peer relationships → bullying behaviors (effect value of 0.052), with a 95% CI of [0.002, 0.103], accounting for 11.23% of the total effect; the second indirect effect was generated through the pathway of parental rejection → internet addiction → bullying behaviors (effect value 0.013), with a 95% CI of [0.002, 0.029], accounting for 2.81% of the total effect; and the third indirect effect was generated through the pathway of parental rejection → peer relationships → internet addiction → bullying behaviors (effect value 0.008), with a 95% CI of [0.001, 0.018], accounting for 1.73% of the total effect.

Table 2

The mediating effects of peer relationships and internet addiction between parental rejection and school bullying behaviors among adolescents

Path	Effect values	Standard errors	95% CI	Effect proportions
Parental rejection → school bullying behaviors	0.390	0.037	0.318~0.462	84.23%
Parental rejection → peer relationships → school bullying behaviors	0.052	0.025	0.002~0.103	11.23%
Parental rejection → internet addiction → school bullying behaviors	0.013	0.007	0.002~0.029	2.81%
Parental rejection → peer relationships → internet addiction → school bullying behaviors	0.008	0.004	0.001~0.018	1.73%

Additionally, the mediation effect analysis results (shown in Table 3 and Figure 2) also demonstrate that the direct effect was significant at 0.219 ($p < 0.05$) for predicting bullying behaviors by parental overprotection, with a 95% CI of [0.145, 0.292], not including 0, indicating significant direct effects and accounting for 68.43% of the total effect.

Table 3

Mediating effects of peer relationships and internet addiction between parental overprotection and school bullying behaviors among adolescents

Path	Effect values	Standard errors	95% CI	Effect proportions
Parental overprotection → school bullying behaviors	0.219	0.038	0.145~0.292	68.43%
Parental overprotection → peer relationships → school bullying behaviors	0.086	0.027	0.035~0.140	26.88%
Parental overprotection → internet addiction → school bullying behaviors	0.001	0.006	-0.014~0.010	0.31%
Parental overprotection → peer relationships → internet addiction → school bullying behaviors	0.014	0.005	0.005~0.025	4.38%

The mediating effect value of peer relationships between parental overprotection and bullying behaviors among adolescents was 0.086, with a 95% CI of [0.035, 0.140], not including 0, indicating that the mediating effect is significant and accounts for 26.88% of the total effect. The serial mediating effect of peer relationships and internet addiction between parental overprotection and bullying behaviors among adolescents was 0.014, with a 95% CI of [0.005, 0.025], not including 0, indicating that the serial mediation effect is significant and accounts for 4.38% of the total effect.

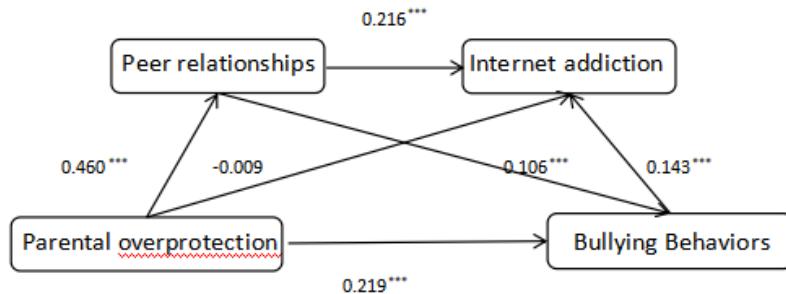


Fig.2: Results of the mediation effect analysis involving parental overprotection

4. Discussion

4.1 The Mechanisms behind the Impact of Negative Parenting Styles on School Bullying Behaviors Among Adolescents

The study findings confirm that negative parenting styles, specifically rejection and overprotection, are positive predictors of school bullying behaviors among adolescents, supporting Hypothesis 1. These results align with previous research, where Nansel et al. [16] highlighted that flaws in character development, shaped by family education, significantly contribute to school bullying behaviors. Wang et al. [21] also suggested that the primary cause of school bullying behaviors is inadequate guardianship, typically reflected in poor educational practices and unsound parenting methods. Song indicated that negative parenting styles significantly and positively predict aggressive behaviors. A parenting style characterized by rejection often leaves students feeling unsupported, unloved, and powerless, which can transform internal negative emotions into extreme repression. This repression then manifests as aggressive behavior, triggering school bullying. This dynamic also reflects the broader impact of negative parenting styles. Similarly, an overprotective parenting style tends to foster domineering and selfish traits in children, who then often prioritize their interests and feelings and might resort to aggression when their desires are thwarted. Overprotection also deprives children of their autonomy and control, leading them to seek control through bullying, which, in turn, reinforces such behaviors. Therefore, the dimensions of parental rejection and overprotection are significant predictors of school bullying behaviors among adolescents.

4.2 The Mediating Role of Peer Relationships

The study findings reveal that peer relationships significantly mediate the relationship between negative parenting (rejection and overprotection) and school bullying behaviors among adolescents, corroborating Hypothesis 2 and aligning with existing literature. Empirical research suggests that peer acceptance acts as a protective factor against social anxiety [6; 18], while negative peer relationships are identified as a risk factor [17]. The closeness of students' peer relationships and the level of mutual support within the group profoundly influence the frequency of school bullying incidents. Students lacking peer support or who are less accepted or recognized by their peers are significantly more likely to experience bullying. Further research has shown that negative parenting styles, characterized by rejection—such as neglect and harsh punishment—predict adverse developmental outcomes and negatively impact children's social adaptability, often resulting in fewer and lower-quality friendships [10; 20]. In families where parental rejection is prevalent, students may struggle to establish and maintain positive interpersonal interaction patterns, making it challenging to form and sustain friendships at school. Conversely, in overly protective families, where choice and autonomy are restricted—including in choosing and maintaining friendships—peer relationships tend to deteriorate. Additionally, poor peer interactions can amplify fears of

social engagement, and traits such as timidity and meekness may make students prime targets for bullying.

4.3 The Mediating Role of Internet Addiction

The study findings reveal that internet addiction significantly mediates the relationship between parental rejection and school bullying behaviors among adolescents, although it does not significantly mediate the relationship between parental overprotection and bullying behaviors. This partial alignment with Hypothesis 3 diverges from some previous findings. Chou and Lee [5] established that negative parenting styles, such as rejection and overprotection, significantly predict internet addiction among college students. Yang [22] further found that internet addiction related to violent games significantly predicts bullying behaviors among junior high students. However, few studies clarify the mediating role of internet addiction between negative parenting styles and school violence. While both parental rejection and overprotection are categorized as negative parenting styles, their manifestations differ. Parental rejection may lead to self-doubt in children, fostering negative emotions like inferiority and guilt, which may be projected in their social interactions. These students might seek validation and self-affirmation in the virtual world, resorting to school bullying to garner attention or care from their families. Conversely, parental overprotection often results in close monitoring of students' behaviors, facilitating earlier detection and intervention in problematic behaviors, such as academic burnout and internet addiction. Thus, while internet addiction may mediate the relationship between parental rejection and school bullying behaviors, its mediating role between parental overprotection and bullying behaviors appears insignificant.

4.4 The Serial Mediating Role of Peer Relationships and Internet Addiction

This study also found that peer relationships and internet addiction serve as serial mediators between negative parenting styles and school bullying behaviors among adolescents, confirming Hypothesis 4. The socialization process outside the family typically unfolds within peer relationships Harris [7], with parenting styles often serving as templates for individuals' approaches to social interactions. Experiences of negative parenting naturally extend into peer interactions Chou and Lee [5], leading to social distress. The internet, which is particularly appealing to those who adopt avoidance as a coping strategy, offers a channel for virtual interactions. Adolescents prone to negative coping mechanisms are more likely to use the internet to alleviate poor emotions and resolve various dilemmas, gradually blurring the lines between real and virtual worlds, and potentially fostering an addiction [19]. The risk of developing internet addiction escalates when adolescents do not receive sufficient emotional and psychological support. Adolescents, whose judgment, cognition, and regulation abilities are still maturing, are especially susceptible to influences from the internet, including violent online games, which can heighten their propensity for committing school violence [3]. Additionally, adolescents characterized by impulsivity, aggressiveness, and neurotic traits are also at higher risk for developing internet addiction [1; 14]. The occurrence of internet addiction and bullying behaviors, both problematic behaviors among adolescents, not only hampers students' psychological health but can also inflict trauma on others. Therefore, alongside clarifying the interrelations among negative parenting styles, peer relationships, internet addiction, and bullying behaviors, developing strategies to harmonize efforts across homes, schools, and communities to foster a supportive environment conducive to the healthy development of adolescents is imperative.

4.5 Governance and Risk-Management: Implications and Recommendations

We frame school bullying as an organizational safety and operations risk, translating the

empirically supported causal chain of negative parenting, peer relationships, internet addiction, and bullying into a governance system following a Plan-Do-Check-Act (PDCA) cycle. The goal is to convert statistical associations into actionable decisions, clear process ownership, and structured resource allocation for sustainable school governance. The identification (Plan) stage employs a brief toolkit—s-EMBU-C (rejection, overprotection), Self-Rating Scale for Peer Relationships, 8-item Internet Addiction Questionnaire (cutoff ≥ 4), and the Bullying Behaviors Questionnaire—as initial risk indicators and baseline metrics. School-wide screening occurs once per semester, with monthly follow-ups for high-risk students. Students are categorized as rejection-exposure, overprotection-dominant, peer-deficit, or combined high-risk. Schools operationalize these profiles via a standardized Bullying Risk Index (BRI), with percentile-based thresholds and early-warning triggers like internet addiction, increased bullying reports, and poor peer-relationship scores. The intervention (Do) stage features differentiated strategies based on risk profiles within a three-tier framework (universal, selected, indicated). Parent-support interventions for rejection-exposure prioritize emotional communication and recalibration of rejecting behaviors, coupled with digital-behavior interventions. In overprotection cases, autonomy support and shared decision-making are emphasized. Delivery modes include universal parent micro-modules, small-group coaching, and individualized family agreements. Classroom-climate management establishes prosocial norms, cooperative-learning routines, and peer-support networks universally, provides small-group skills training selectively, and tailors individualized behavior support for severe cases. Digital-behavior governance integrates universal digital-literacy education, targeted groups for problematic internet use, and individualized plans when addiction thresholds are exceeded. Digital-behavior interventions are prioritized under parental rejection; autonomy and peer-climate interventions dominate under overprotection, with digital interventions used for co-occurring issues. The evaluation (Check) stage systematically tracks screening and training coverage, routine adherence, session completion, peer-relationship scores, internet-addiction prevalence, bullying incidence, and parent participation. Monthly reviews utilize statistical-process-control dashboards. Small-scale pilots guide intervention scaling or revision. In the improvement (Act) stage, monthly PDCA reviews inform adjustments to intervention intensity, staff workloads, and curricula. Low-impact activities are phased out, and resources reallocated. Semester recalibration of the BRI and content updates promote continuous improvement toward safer, healthier, and inclusive classrooms, aligning with social sustainability goals. Clearly defined operational roles enhance governance: a vice principal leads the anti-bullying team; student affairs coordinates processes; teachers and counselors manage interventions; the IT center provides data and dashboards; and the parent committee supports family education and follow-ups. Regular meetings ensure coordinated action across family dynamics, peer relationships, and digital behaviors, translating evidence into structured risk-management practices and sustainable governance.

5. Conclusions

(1) There are significant pairwise correlations between negative parenting styles, peer relationships, internet addiction, and school bullying behaviors among adolescents. Negative parenting, characterized by rejection and overprotection, positively predicts school bullying behaviors among these students.

(2) Peer relationships partially mediate the relationship between negative parenting and school bullying behaviors among adolescents.

(3) Furthermore, peer relationships and internet addiction serially mediate the relationship between negative parenting and school bullying behaviors among adolescents.

Overall, this study contributes to the field of decision-making and risk management by

embedding these findings into a PDCA-based governance model, thereby offering an operations-management framework for evidence-based interventions in school bullying risk.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions

Prof. Si Huafeng was responsible for the conception and design of the paper, data distribution and collection, obtaining funding, submission and revision, and Prof. Zhang Dandan was responsible for literature collation, research preparation, data analysis, thesis writing, and drawing charts.

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Data Availability Statement

The datasets [GENERATED/ANALYZED] for this study can be found in the [Chained mediation results (controlling for gender)] [LINK]. Please see the “Availability of data” section of Materials and data policies in the Author guidelines for more details.

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